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LOW VOID ADSORPTION SYSTEMS AND USES THEREOFAbstract of the Disclosure

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A low void pressure swing adsorption system wherein flow movement and pressure pulse are influenced from the same source comprised of at least one hermetically sealed vessel containing an adsorbent bed with an inlet coupled to the adsorbent bed by way of an inlet header and an outlet coupled to the adsorbent bed by way of an outlet header. Void volume of the inlet and outlet headers can be limited to less than 20% of the adsorbent bed volume, preferably to less than 10%, and most preferably to less than 5%, by mounting high pressure source(s) and/or low pressure sink(s) proximate to, or nearly proximate to, the adsorbent bed/vessel. Low void volumes and reduced cycle times may be achieved in all bed configurations, including flat header beds, segmented beds, and vertical beds. Radial beds may be configured so that the void volume of the inlet and outlet headers is less than 50% of the volume of the radial adsorbent bed, preferably to less than 20%, and most preferably to less than 10%.